

### **REMARKS**

This paper responds to the Office Action mailed on June 22, 2006.

None of the claims are amended, canceled, or added. Claims 1-13 and 23-31 remain pending in this application.

#### **Objection to the Official Notice**

The Office Action cites DeStephano et al. patent (U.S. 5,801,446), DeStephano et al. (U.S. 6,324,754), and Wei et al. (U.S. 5,703,394) to reject claims 2 and 3 of the present application under 35 USC § 103(a) based on reasons that some of the specific features in these claims, although not taught by the cited art, are obvious matter of design choice. Applicant assumes that the Examiner is taking Official Notice in rejecting these claims because the Office Action offers no documents to support the rejection of the specific features in these claims. Applicant respectfully traverses the taking of Official Notice and, pursuant to M.P.E.P. § 2144.03, Applicant requests documents or an affidavit to support the rejection. Moreover, Applicant cannot find in the cited art a motivation to modify the teaching of the cited art as proposed in the Office Action. In the absence of documents or an affidavit to support the rejection of claims 2 and 3, Applicant requests reconsideration, withdrawal of the rejection, and allowance of these claims.

Notwithstanding the objection to the taking of Official Notice above, Applicant believes that claims 2 and 3 are patentable over the cited art for the reasons presented below.

#### **§102 Rejection of the Claims**

**Claims 23-27 were rejected under 35 USC § 102(b) as being anticipated by DiStefano et al. (U.S. 5,801,446, hereinafter referred to as DiStefano '446).**

Applicant respectfully traverses for at least the reason presented below.

Independent claim 23 recites, among other things, aligning the first circuit board with the second circuit board by “engaging” the spacer with an opening in the second circuit board so that a second bond pad of the second circuit board aligns with the first bond pad, and the spacer “directly” contacts the second bond pad.

The Office Action compares core 30/134 of DiStefano '446 to the spacer of claim 23 and contact pad 52/152 of DiStefano '446 to the second bond pad of claim 23. The Office Action relies on DiStefano '446, column 11, lines 11-15 and asserts that DiStefano '446 teaches that core 30/134 “directly” contacts contact pad 52/152. Applicant respectfully disagrees.

DiStefano '446, column 11, lines 8-16 (which includes the cited column 11, lines 11-15) states:

“For example, a unit bonding material or **first solder** can be **applied to the terminals separately** from the cores, as by application of a solder paste to the terminals. Joining units including the solid core, but omitting the unit bonding material, can be bonded to the terminals. In such an arrangement, the joining unit may be devoid of solder or else may include the pad bonding material or **second solder** used to bond with the **contact pads** of the substrate.”

As stated above, the bonding material (e.g., solder 32 of FIG. 3) may be omitted from the joining unit of DiStefano '446 but a separate first solder can be applied to the terminal (e.g. terminal 26 of FIG. 3) and a separate second solder can be used so that the joining unit, including the core (e.g., core 30 of FIG. 3) can be bonded to the terminals and the contact pad. Thus, although an arrangement of DiStefano '446 can omit the bonding material, DiStefano '446 applies first solder and second solder separately on the terminal and the contact pad, respectively, to bond the joining unit to the terminal and the contact pad. Therefore, in DiStefano '446, since the second solder is applied on the contact pad, Applicant does not see how the core (e.g., core 30 of FIG. 3) of DiStefano '446 can “directly” the contact pad (e.g., contact pad 52 of FIG. 3) of DiStefano '446. In contrast, claim 23 recites that the spacer “directly” contacts the second bond pad. Accordingly, Applicant requests reconsideration, withdrawal of the rejection, and allowance of claim 23.

#### Dependent claims 24-27

Dependent claims 24-27 depend from claim 23 and recite the things of claim 23. Thus, Applicant believes that claims 24-27 are not anticipated by DiStefano '446 for at least the reasons presented above regarding claim 23, plus the additional things recited in claims 24-27.

For example, regarding claim 24, Applicant cannot find in DiStefano '446 applying a conductive material "in proximity to an area of the spacer and the first bond pad" before attaching the first circuit board to the second circuit board. The Office Action relies on DiStefano '446, column 11, lines 13-16 to reject claim 24. However, as stated above regarding column 11, lines 8-16, DiStefano '446 applies the first solder to the terminal (first bond pad) "separately" from the core (or spacer) and *not* to both the core and the terminal.

In another example, regarding claim 25, Applicant cannot find in DiStefano '446 heating the conductive material to allow the conductive material to "directly" contact the first bond pad "and" the second bond pad. The Office Action relies on FIG. 5 of DiStefano '446 to reject claim 25. However, FIG. 5 of DiStefano '446 shows core 330 is separated from the contact pad by a conductive material or solder 333. Thus, in DiStefano '446, the contact pad does not "directly" contact core 330. In contrast, claim 25 recite the element of the base claim 23 such as the spacer "directly" contacts the second bond pad. Further, FIG. 5 of DiStefano '446 shows conductive material 333 and conductive material 332. However, each of conductive material 333 and conductive material 332 of DiStefano '446 *does not* "directly" contact both the contact pad above core 330 *and* terminal 320. In contrast, claim 25 recite heating the conductive material to allow the conductive material to "directly" contact the first bond pad "and" the second bond pad.

Based on all of the reasons presented above, Applicant believes that claims 24-27 are not anticipated by DiStefano '446. Accordingly, Applicant requests reconsideration, withdrawal of the rejection, and allowance of claims 24-27.

**Claims 23-27 were rejected under 35 USC § 102(e) as being anticipated by DiStefano et al. (U.S. 6,324,754, hereinafter referred to as DiStefano '754).**

Applicant respectfully traverses for at least the reason presented below.

Independent claim 23 recites, among other things, aligning the first circuit board with the second circuit board by "engaging" the spacer with an opening in the second circuit board so that a second bond pad of the second circuit board aligns with the first bond pad, and the spacer "directly" contacts the second bond pad.

The Office Action compares core 42 (FIG. 3) of DiStefano '754 to the spacer of claim 23 and contact pad 52 (FIG. 4) of DiStefano '754 to the second bond pad of claim 23. The Office

Action asserts that DiStefano '754 teaches that core 42 “directly” contacts contact pad 52.

Applicant respectfully disagrees. DiStefano '754, FIG. 3, shows a solder 44 “overlying” core 42 (see also DiStefano '754, column 7, lines 24). Thus, when solder ball 40 (which includes core 42 *and* solder 44) is engaged with contact pad 52 (FIG. 4), core 42 *cannot* “directly” contacts contact pad 52 because solder 44 is between core 42 and contact pad 52. In contrast, claim 23 recites aligning the first circuit board with the second circuit board by “engaging” the spacer with an opening in the second circuit board so that a second bond pad of the second circuit board aligns with the first bond pad, and the spacer “directly” contacts the second bond pad.

#### Dependent claims 24-27

Dependent claims 24-27 depend from claim 23 and recite the things of claim 23. Thus, Applicant believes that claims 24-27 are not anticipated by DiStefano '754 for at least the reasons presented above regarding claim 23, plus the additional things recited in claims 24-27. For example, regarding claim 24, Applicant cannot find in DiStefano '754 applying a “conductive material” in proximity to an area of the spacer “and” the first bond pad before attaching the first circuit board to the second circuit board. The Office Action compares the “flux” of DiStefano '754 to the conductive material of claim 24. Applicant submits that flux is not a conductive material but is commonly a material to remove surface oxides and impurities and to improve wetability during soldering. Thus, Applicant submits that DiStefano '754 does not teach applying a “conductive material” in proximity to an area of the spacer “and” the first bond pad before attaching the first circuit board to the second circuit board. Based on all of the reasons presented herein, Applicant believes that claims 24-27 are not anticipated by DiStefano '754. Accordingly, Applicant requests reconsideration, withdrawal of the rejection, and allowance of claims 24-27.

#### §103 Rejection of the Claims

**Claims 1-9 and 30-31 were rejected under 35 USC § 103(a) as being unpatentable over either DiStefano '446 or DiStefano '754 as applied to claim 23 above in view of Wei et al. (U.S. 5,703,394 hereinafter referred to as Wei).**

Applicant respectfully traverses for at least the reason presented below.

Independent claim 1 recites, among other things, aligning the first circuit board with the second circuit board by "engaging" the spacers with openings in the second circuit board so that the one or more second bond pads of the second circuit board align with the one or more first bond pads, and the one or more second bond pads "directly" contacting the one or more spacers.

Applicant also believes that claim 1 is patentable over DiStefano '446/Wie or DiStefano '754/Wei because Applicant is unable to find in DiStefano '446/Wie or DiStefano '754/Wei everything recited in claim 1. For example, for at least the reasons presented above regarding claim 23, Applicant is unable to find in DiStefano '446/Wie or DiStefano '754/Wei, whether considered individually or in combination, aligning the first circuit board with the second circuit board by "engaging" the spacers with openings in the second circuit board so that the one or more second bond pads of the second circuit board align with the one or more first bond pads, and the one or more second bond pads "directly" contacting the one or more spacers.

Further, Applicant believes that DiStefano '446 and Wei teach different things from each other and that DiStefano '754 and Wei also teach different things from each other. For example, each DiStefano '446 and DiStefano '754 teaches bonding a chip to a substrate whereas Wei teaches using a printed circuit board (PCB) to encapsulate an array of light emitting device. Therefore, Applicant cannot find in DiStefano '446/Wie or DiStefano '754/Wei a motivation to combine the different teachings of DiStefano '446 or DiStefano '754 and Wei as proposed by the Office Action.

Based on all of the reasons presented above, Applicant believes that claim 1 is patentable over DiStefano '446/Wei or DiStefano '754/Wei, whether considered individually or in combination. Accordingly, Applicant requests reconsideration, withdrawal of the rejection, and allowance of claim 1.

#### Dependent claims 2-9

Dependent claims 2-9 depend from claim 1 and recite the things of claim 1. Thus, Applicant believes that claims 2-9 are patentable over DiStefano '446/Wei or DiStefano '754/Wei for at least the reasons presented above regarding claim 1, plus the additional things recited in claims 2-9.

For example, regarding claim 2, the Office Action admits that both DiStefano ‘446 and DiStefano ‘754 do not teach forming spacers by electroplating. The Office Action states that this limitation (forming spacers by electroplating) would have been an obvious matter of “design choice”. The Office Action offers no documents to support the rejection of "forming spacers by electroplating". Thus, Applicant assumes that the Examiner is taking Official Notice in rejecting claim 2. As stated above, Applicant respectfully traverses the taking Official Notice and requests documents or an affidavit to support the rejection. Further, as presented above regarding claim 1, Applicant cannot find a fair suggestion or a motivation to combine the different teachings of DiStefano ‘446 or DiStefano ‘754 and Wei as proposed by the Office Action.

In another example, regarding claim 3, the Office Action admits that both DiStefano ‘446 and DiStefano ‘754 do not teach "welding" the one or more spacers to the one or more first bond pads. The Office Action states that this limitation ("welding" the one or more spacers to the one or more first bond pads) would have been an obvious matter of “design choice”. The Office Action offers no documents to support the rejection of "welding" the one or more spacers to the one or more first bond pads. Thus, Applicant assumes that the Examiner is taking Official Notice in rejecting claim 3. As stated above, Applicant respectfully traverses the taking Official Notice and requests documents or an affidavit to support the rejection. Further, as presented above regarding claim 1, Applicant cannot find a fair suggestion or a motivation to combine the different teachings of DiStefano ‘446 or DiStefano ‘754 and Wei as proposed by the Office Action.

Based on all of the reasons presented above, Applicant believes that claims 2-9 are patentable over DiStefano ‘446/Wei or DiStefano ‘754/Wei, whether considered individually or in combination. Accordingly, Applicant requests reconsideration, withdrawal of the rejection, and allowance of claims 2-9.

#### Dependent claims 30 and 31

Dependent claims 30 and 31 depend from claim 23 and recite the things of claim 23. Thus, Applicant believes that claims 30 and 31 are patentable over DiStefano ‘446/Wei or DiStefano ‘754/Wei for at least the reasons presented above regarding claim 23, plus the additional things recited in claims 30 and 31.

Claim 30 recites, among the other things of the base claim 23, that “the optoelectrical display elements are isolated from each other by a dielectric material”. The Office Action states that the limitation of claim 30 is met as detailed in the rejection of claim 1. In rejecting claim 1, the Office Action compares element 11 of Wei to the optoelectrical display elements of claim 1. However, the Office Action, in rejecting claim 1, does not mention anything about element 11 being isolated from each other by a dielectric material. Nevertheless, Applicant cannot find in DiStefano ‘446/Wei or DiStefano ‘754/Wei any optoelectrical display elements being isolated from each other by a dielectric material. In contrast, claim 30 recites that “the optoelectrical display elements are isolated from each other by a dielectric material”. Further, as presented above regarding claim 1, Applicant cannot find in DiStefano ‘446/Wei or DiStefano ‘754/Wei a fair suggestion or a motivation to combine the different teachings of DiStefano ‘446 or DiStefano ‘754 and Wei as proposed by the Office Action. Accordingly, Applicant requests reconsideration, withdrawal of the rejection, and allowance of claim 30.

Claim 31 recites, among the other things of the base claim 23, that “the optoelectrical display elements are formed over a glass substrate of the second circuit board, and wherein the first bond pad is formed over a ceramic substrate of the first circuit board”. The Office Action states that the limitation of claim 31 is met as detailed in the rejection of claim 1. However, the Office Action, in rejecting claim 1, does not mention anything about “the optoelectrical display elements are formed over a glass substrate of the second circuit board, and wherein the first bond pad is formed over a ceramic substrate of the first circuit board”. Nevertheless, Applicant cannot find in DiStefano ‘446/Wei or DiStefano ‘754/Wei any optoelectrical display elements being formed over a glass substrate of the second circuit board, and wherein the first bond pad is formed over a ceramic substrate of the first circuit board. In contrast, claim 31 recites that “the optoelectrical display elements are formed over a glass substrate of the second circuit board, and wherein the first bond pad is formed over a ceramic substrate of the first circuit board”. Further, as presented above regarding claim 1, Applicant cannot find in DiStefano ‘446/Wei or DiStefano ‘754/Wei a fair suggestion or a motivation to combine the different teachings of DiStefano ‘446 or DiStefano ‘754 and Wei as proposed by the Office Action. Accordingly, Applicant requests reconsideration, withdrawal of the rejection, and allowance of claim 31.

**Claims 10-13 were rejected under 35 USC § 103(a) as being unpatentable over either DiStefano et al. in view of Wei et al. (U.S. 5,703,394) as applied above, and further in view of Marrs.**

Dependent claims 10-13 depend from claim 1 and recite the things of claim 1. Thus, Applicant believes that claims 10-13 are patentable over DiStefano '446/Wei/Marrs or DiStefano '754/Wei/Marrs for at least the reasons presented above regarding claim 1, plus the additional things recited in claims 10-13.

For example, claim 11 recites, among other things from base claims 1 and 10, that inserting the insulating material comprises injecting the insulating material into the interface region "by a vacuum fill process" after attaching the first circuit board to the second circuit board. The Office Action does not point out where in DiStefano '446/Wei/Marrs or DiStefano '754/Wei/Marrs that teaches inserting the insulating material comprises injecting the insulating material into the interface region "by a vacuum fill process" after attaching the first circuit board to the second circuit board. Nevertheless, Applicant cannot find in DiStefano '446/Wei/Marrs or DiStefano '754/Wei/Marrs a teaching or fair suggestion of inserting the insulating material comprises injecting the insulating material into the interface region "by a vacuum fill process" after attaching the first circuit board to the second circuit board. Moreover, for at least the reasons presented above regarding claim 1, Applicant cannot find in DiStefano '446/Wei/Marrs or DiStefano '754/Wei/Marrs a fair suggestion or a motivation to combine the different teachings of DiStefano '446 or DiStefano '754 with Wei and Marrs as proposed by the Office Action. Accordingly, Applicant requests reconsideration, withdrawal of the rejection, and allowance of claim 11.

In another example, claim 12 recites, among other things from base claims 1 and 10, that inserting the insulating material comprises applying the insulating material to one of the first circuit board and the second circuit board, followed by "partially curing the insulating material, prior to attaching the first circuit board to the second circuit board". The Office Action compares insulating material 199 or 601 of Marrs to the insulating material of claim 12, and chip 201 and substrate 501 of Marrs to the first and second circuit boards of claim 12, respectively. However, Applicant cannot find in Marrs that insulating material 199 (or 601) of Marrs is applied to chip 201 (or substrate 501) followed by partially curing the insulating material 199 (or



601), prior to attaching chip 201 to substrate 501. In contrast, claim 12 recites that inserting the insulating material comprises applying the insulating material to one of the first circuit board and the second circuit board, followed by “partially curing the insulating material, prior to attaching the first circuit board to the second circuit board”. Moreover, for at least the reasons presented above regarding claim 1, Applicant cannot find in DiStefano ‘446/Wei/Marrs or DiStefano ‘754/Wei/Marrs a fair suggestion or a motivation to combine the different teachings of DiStefano ‘446 or DiStefano ‘754 with Wei and Marrs as proposed by the Office Action. Accordingly, Applicant requests reconsideration, withdrawal of the rejection, and allowance of claim 12.

**Claims 28-29 were rejected under 35 USC § 103(a) as being unpatentable over either one of DiStefano et al. in view of Marrs (U.S. 5,795,818).**

Dependent claims 28 and 29 depend from claim 23 and recite the things of claim 23. Thus, Applicant believes that claims 28 and 29 are patentable over DiStefano ‘446/Marrs or DiStefano ‘754/Marrs for at least the reasons presented above regarding claim 23, plus the additional things recited in claims 28 and 29.

For example, claim 29 depends from base claims 23, 26, and 28. Thus, claim 29 recites the things of base claims 23, 26, and 28 such as “the spacer directly contacts the first bond pad” (from claim 23). Claim 29 also recites that injecting the insulating material comprises “isolating the insulating material from the first bond pad and the second bond pad”. The Office Action does not show how both “the spacer directly contacts the first bond pad” and “isolating the insulating material from the first bond pad and the second bond pad” are taught by DiStefano ‘446/Marrs or DiStefano ‘754/Marrs, whether considered individually or in the proposed combination.

Regarding DiStefano ‘446, the Office Action, page 2, states that DiStefano ‘446 column 11, lines 11-15 teaches that spacer 30 or 134 directly contacts bond pad 26. In this column 11, lines 11-15, DiStefano ‘446 teaches that joining unit including the solid core (e.g., core 30 of FIG. 2), omitting the unit bonding material such as solder (e.g., solder 32 of FIG. 2), can be bonded to the terminals (e.g., terminal 26 of FIG. 2). Although Applicant does not agree that DiStefano ‘446 teaches the things of claim 23 such as “the spacer directly contacts the first bond pad”, for the purposes of discussion of claim 29, Applicant cannot find in DiStefano ‘446 how,

with the omission of solder 32, core (spacer) 30 of DiStefano ‘446 can directly contacts the terminal 26 *and* the insulating material (after injected into the interface region) can be *isolated* from terminal 26 and contact pad 52 (FIG. 2).

Regarding DiStefano ‘754, FIG. 4 of DiStefano ‘754 show contacts 22 and 24 (contacts on top and bottom of core 42). Applicant cannot see how an insulating material (after injected into the interface region where core 42 is located) is isolated from the contacts 22 and 24.

Further, Applicant believes that DiStefano ‘446 and Marrs teach different things from each other and that DiStefano ‘754 and Marrs also teach different things from each other. Thus, Applicant cannot find in DiStefano ‘446/Marrs or DiStefano ‘754/Marrs a motivation to combine the different teachings of DiStefano ‘446 or DiStefano ‘754 and Marrs as proposed by the Office Action.

Based on all of the reasons presented above, Applicant believes that claims 28 and 29 are patentable over DiStefano ‘446/Marrs or DiStefano ‘754/Marrs, whether considered individually or in combination. Accordingly, Applicant requests reconsideration, withdrawal of the rejection, and allowance of claims 28 and 29.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (612) 373-6969 to facilitate prosecution of this application.


If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

ROBERT C. SUNDAHL ET AL.

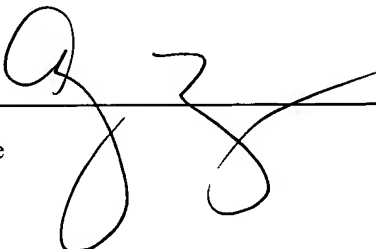
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